An abstract, *Incremental Effectiveness of Personal Computer Aviation Training Devices (PCATDs) and a Flight Training Device (FTD),* has been accepted for presentation at the annual meeting of the American Psychological Association, July 2004.

# INCREMENTAL TRANSFER OF TRAINING EFFECTIVENESS OF A PERSONAL COMPUTER AVIATION DEVICE (PCATD) AND A FLIGHT TRAINING DEVICE (FTD)

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A study by Taylor, Talleur, Emanuel, Rantanen, Bradshaw, and Phillips (2002) compared the incremental effectiveness of three groups of students who received 5, 10 or 15 hours of prior training in a Personal Computer Aviation Training Device (PCATD) with a group trained only in the airplane (control group). The results indicated that the 5 hour PCATD group performed significantly better in the airplane than the control group. The 10 and 15 hour PCATD groups showed little additional improvement over the PCATD 5 group.

To evaluate transfer of training effectiveness of a flight training device (FTD), the performance of subjects trained on instrument tasks in an FTD and later trained to criterion in an airplane must be compared to the performance of subjects trained to criterion only in the airplane. This comparison results in a transfer effectiveness ratio (TER). An incremental transfer effectiveness ratio (ITER) can be used to determine the transfer effectiveness of successive amounts of prior training in the ground trainer. It is known that the TER and the ITER are negatively decelerated functions. Successive increments of training in a FTD have been found to decrease the average TER and the ITER. Incremental transfer functions need to be determined in order to measure the effectiveness of a FTD and to determine the point at which additional training in a FTD is no longer effective.

A total of 180 University of Illinois, Institute of Aviation private pilot students are participating in the study (30 subjects in each group). All students enrolled in the instrument program of the Institute will be involved in the study. Training in the FTD is being conducted in four Frasca 141 FTDs with a generic single-engine, fixed-gear, and fixed-pitch propeller performance model. The PCATD training is being conducted using FAA approved PCATDs from Aviation Teachware Technologies (ELITE) v 6.0.2, and flight controls by Precision Flight Controls. These PCATDs simulate the flight characteristics of the Piper Archer III. Airplane training is being carried out in the Piper Archer III aircraft which is a single engine, fixed pitch propeller, fixed under carriage aircraft. To determine incremental transfer (amount of training), four experimental groups are receiving 5, 10, 15 and 20 hours of prior Frasca training during the instrument curriculum. Transfer effectiveness ratios and incremental transfer effectiveness ratios will be computed comparing each experimental group with the Control group. AVI 130

The paper will compare the results of the first 2 years of the study and relate these results to those found in the study by Taylor et al. (2002). The results to date indicate that the Airplane Group requires more time to complete the instrument course than the average time for each of the five experimental groups who had prior training in the PCATD or the FTD. The Airplane group required 22.89 hours of dual to complete the course while the five experimental groups required an average of 18.72 hours after prior training in the PCATD or the FTD

The data from the current study indicates that the FTD and the PCATD are effective in teaching basic and advanced instrument tasks to private pilots. This study systematically replicated the findings that PCATDs are useful to teach instrument tasks to private pilots (Taylor et al. 2002). As a result of prior training in an FTD and a PCATD and time to the stage check in AVI 130 and to the instrument rating flight check were less for all experimental groups when compared to a Control group trained only in the airplane. One purpose for conducting an incremental transfer of training study is to determine at what point

additional training in the FTD and the PCATD in no longer effective. We hope to be able to answer the question of how can flight schools most effectively use the 10 hours of instrument training time currently permitted by AC No: 61-126.